

The Ants of Northeastern Minnesota

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Whereas over 90 species of ants (including subspecies and varieties) are known from that part of the Upper Austral Zone in the vicinity of Chicago, Illinois (Gregg 1944), as yet only 40 species are represented in our collection of the Lake Superior district and constitute the basis of this paper. The localities where ants were obtained lie entirely within the Canadian Zone, and the specimens illustrate well the typical ant fauna of a northern climate. Some forms characteristic of the more southern area are present in Duluth but seem not to be as conspicuous, and many of their associates in Illinois are completely absent from Duluth, as would be expected. They have been replaced by boreal types not found at all or only rarely south of the coniferous forests. It appears that most of the timber in this portion of Minnesota is of second growth, and while new evergreen forests are developing, many square miles are occupied by aspen communities. The precise nature of the myrmecological changes that have accompanied the floristic ones it is at present impossible to state, but the monotonous aspect of the ant fauna in certain examples of the typical vegetation (spruce-tamarack bogs and stands of upland conifers), as compared with the greater number of varieties in deciduous woodland and the many forest margins, leads one to suspect that the fauna is more mixed than prior to the disturbance of the forest cover.

In the following list there are probable omissions which further collecting would fill, but it is felt that such an enumeration is justified in view of the scant literature concerning the ant populations in this section of the country. Wheeler (1908) published an account of ten species taken on Isle Royale, Michigan, and almost all are of a distinctly northern distribution. Burrill and Smith (1918, 1919) provided a guide to the ants of Wisconsin and recognized 46 species from that state. There seem to have been no papers other than these devoted to the ants of the upper lake region. The extensive records in Wheeler's (1913) key to the *Formicae* contain no references to Minnesota localities though citations from all the surrounding states and Canadian provinces must be admitted.

For Minnesota vegetation see Rosendahl and Butters 1928.

¹ The materials for this report were gathered with the help of my wife over a period of several years, and except for the specimens obtained at the southern tip of Saganaga Lake, Minnesota, represent mostly the findings in local spots in and near Duluth. We are greatly indebted to Dr. Olga Lakela for her enthusiastic assistance in collecting and for her generosity in making known to us the many natural areas in this part of the state, which otherwise we would never have been able to visit. A few specimens have been contributed by Reino Freeman, Axel Wiljamaa, Irma Roine, Warren Annis, Joseph Zygmanski, Helen Poynter and Ingrid Lahtinen, and acknowledgment of these is made in connection also with the species named. Dr. C. E. Mickel kindly permitted me to examine the ant collection at the University of Minnesota, and arranged for me an exchange of certain specimens.

PONERINAE

1. *Ponera coarctata pennsylvanica* Buckley²

Minnesota: Saganaga Lake.

Habitat: coniferous forest; log stage 53; under rock.

Collections: 2.

The species seems to be present only sporadically in this northern region, and thorough examination of various micro-habitats did not reveal more than a few specimens.

MYRMICINAE

2. *Aphaenogaster tennesseensis* (Mayr)

Minnesota: Hovland (Poynter).

Collections: 1.

Despite careful search for members of the genus, we can record only a single individual of this species, and no habitat data were provided by its collector. Inasmuch as *tennesseensis* is known to be a temporary parasite on species of *A. fulva*, it is possible to predict that the latter should eventually be found in the area.

3. *Harpagoxenus canadensis* M. R. Smith

Minnesota: Duluth (Freeman, Wiljamaa, Zygmanski, Gregg).

Habitat: basswood-maple forest, tamarack-spruce bog; log stages 2 and 3.

Collections: 5.

Two of the colonies had a considerable quantity of brood, and they were associated with *Leptothorax acervorum canadensis* which acts as a slave species.

4. *Leptothorax texanus* Wheeler

Minnesota: Duluth (Wiljamaa).

Habitat: basswood-maple forest.

Collections: 1.

The species appears to be far north of its usual range, and as yet only one specimen has been taken.

5. *Leptothorax (Mychothorax) acervorum canadensis* Provancher

Minnesota: Duluth, Saganaga Lake.

Habitat: basswood-maple forest, aspen forest, tamarack bog, spruce-fir forest, Lake Superior shore rocks; log stage 2.

Collections: 10.

Most of the records are represented by isolated individuals, but one colony had well developed brood and two others were with the nests of *Harpagoxenus*.

6. *Myrmica schenckii emeryana* Forel

Minnesota: Duluth (Freeman, Roine, Gregg), Rice Lake, Holyoke, Knife River, Saganaga Lake.

Wisconsin: Superior, Foxboro.

Habitat: coniferous forest, tamarack bog, basswood-maple forest, oak-ash forest, aspen forest, forest margin, pioneer dunes; log stages 3, 4 and 6; under rocks, sticks and logs, also moss covering rocks.

Collections: 33.

² The third word in trinomials is understood to indicate a subspecies.

³ See Gregg (1944) for description of log stages.

This is an exceedingly common ant and is apparently adaptable to a wide variety of conditions. Almost all the records represent thriving colonies and many of them had clusters of brood. Seven nests had examples of the winged sexes.

7. *Myrmica sabuleti americana* Weber

Minnesota: Duluth (Freeman, Roine, Gregg), Saganaga Lake.

Habitat: coniferous forest, pioneer dunes.

Collections: 9.

In contrast to the preceding species, this ant seems to be much rarer and a few foraging individuals constitute the bulk of our material.

8. *Myrmica brevinodis* Emery

Minnesota: Duluth, Knife River, Saganaga Lake.

Wisconsin: Superior.

Habitat: coniferous forest, tamarack-spruce bog, cedar bog, basswood-maple forest, aspen forest, pioneer dunes, Lake Superior shore rocks; log stages 3, 4 and 5; under rock and wood.

Collections: 10.

Together with *M. s. emeryana* this species characterizes the evergreen woodlands and is well represented in many of the older communities in the region.

9. *Myrmica brevinodis brevispinosa* Wheeler

Minnesota: Duluth, Holyoke.

Habitat: coniferous forest, oak-ash forest.

Collections: 5.

Closely related to the foregoing species but much less abundant. Three specimens were found foraging on vegetation in proximity to two individuals of the ant mimic, *Sericophanes heidemanni* Poppius? (Heteroptera).

10. *Myrmica brevinodis canadensis* Wheeler

Minnesota: Duluth, Holyoke, Knife River, Carlton Co., Saganaga Lake.

Habitat: coniferous forest, coniferous-maple forest, maple-basswood forest, Lake Superior shore rocks; log stages 3, 4 and 5.

Collections: 7.

11. *Stenamma brevicorne impressum* Emery

Minnesota: Saganaga Lake.

Wisconsin: Foxboro.

Habitat: birch forest, forest margin; log stages 4 and 5.

Collections: 2.

This form is always uncommon, or at least its hypogaecic habits lend it that aspect, but the two colonies obtained were very populous and one had a large mass of brood.

DOLICHODERINAE

12. *Dolichoderus (Hypoclinea) taschenbergi aterrimus* Wheeler

Minnesota: Duluth.

Habitat: Lake Superior shore rocks.

Collections: 1.

This ant was taken as it ran about a few feet above the waves on the lake shore. Only two dealated females were secured, and the occurrence of the species in this latitude is problematical since its relatives are notably southern types and no established colony was discovered.

13. *Tapinoma sessile* (Say)

Minnesota: Duluth (Zygmanski, Gregg), Holyoke, Knife River, Saganaga Lake.
Habitat: coniferous forest, birch-conifer ravine, aspen forest, oak-maple forest, basswood-maple forest, forest margin, Lake Superior shore rocks; log stage 2; under rocks.
Collections: 11.
This is the only important example of the subfamily in boreal localities.

FORMICINAE

14. *Lasius niger neoniger* Emery

Minnesota: Duluth, Holyoke.
Habitat: coniferous forest, birch-conifer ravine, foredunes, oak-ash forest.
Collections: 4.

It is less widely distributed than the following species, and the best colonies were in relatively warm situations on sand.

15. *Lasius niger americanus* Emery

Minnesota: Duluth, Holyoke, Carlton Co., Saganaga Lake.
Wisconsin: Foxboro.
Habitat: coniferous forest, maple-conifer forest, oak-maple forest, forest margin, pasture; log stages 2, 3 and 4; under rocks and wood.
Collections: 16.

As would be expected, this eurous ant is a conspicuous member of the biota. It occupies a broad range over the North American continent.

16. *Lasius niger sitkaensis* Pergande

Minnesota: Duluth, Holyoke.
Habitat: coniferous forest, birch-conifer ravine, oak-ash forest; under wood.
Collections: 6.

One of the most typical of northern insects, and to my knowledge does not occur south of the Transition Zone. It was originally described from Alaska.

17. *Lasius (Chthonolasius) umbratus aphidicola* (Walsh)

Minnesota: Duluth.
Habitat: pioneer dunes.
Collections: 1.

The data for this species are not particularly reliable as one wingless female was captured wandering over the sand on Minnesota Point, and no nests of the ant have been located thus far.

18. *Formica (Proformica) neogagates vetula* Wheeler

Minnesota: Duluth, Holyoke.
Wisconsin: Foxboro.
Habitat: birch-conifer ravine, basswood-maple forest, oak-ash forest, forest margin, pioneer dunes.
Collections: 6.

It is present in tolerable numbers, but the typical form of the species which occurs commonly in the same habitats with this subspecies in Illinois seems to be entirely absent from the Duluth area.

19. *Formica (Proformica) limata* Wheeler

Minnesota: Carlton.
Habitat: log stage 3.
Collections: 1.
Originally described from fairly high altitudes in Colorado, hence its occurrence in the northern part of the eastern states is not surprising.

20. *Formica cinerea neocinerea* Wheeler

Minnesota: Duluth.

Collections: 1.

Although this ant is a predominant one in the prairies of the central United States it was secured on but one occasion in eastern Minnesota, and is probably at the edge of its normal distribution. It is possible that with the destruction of continuous forest and the development of grassland conditions, the species has extended into the Lake Superior district.

21. *Formica fusca* Linnaeus

Minnesota: Duluth (Annis, Gregg).

Habitat: basswood-maple forest, spruce bog, forest margin.

Collections: 4.

This species is remarkable for its circumpolar, boreal distribution. However, it was found to be less abundant in Duluth area than I had suspected, and fewer records of it were obtained than of some of its subspecies.

22. *Formica fusca subaenescens* Emery

Minnesota: Duluth (Roine, Wiljamaa, Gregg), Carlton, Holyoke, Knife Island, Saganaga Lake.

Habitat: coniferous forest, spruce-fir forest, basswood-maple forest, aspen forest, oak-maple forest; log stages 3 and 4.

Collections: 14.

An ant of the northern climate, and in mountainous regions it reaches high elevations. It is more frequently encountered than in the Illinois collections, and in the latter state is correlated with cool and shady stations.

23. *Formica fusca subsericea* Say

Minnesota: Duluth, Rice Lake, Holyoke, Hovland (Poynter), Saganaga Lake.

Wisconsin: Foxboro.

Habitat: coniferous forest, spruce-fir forest, oak-ash forest, tamarack bog, aspen forest, forest margin; log stage 3; under rocks and logs.

Collections: 19.

This insect is tolerant of great variations in its environment, and occurs over almost all of eastern United States with an extension into the southwest. It is one of the most suitable species for use as slaves by ants of the *sanguinea* group.

24. *Formica fusca algida* Wheeler

Minnesota: Duluth, Carlton, Carlton Co., Saganaga Lake.

Wisconsin: Foxboro.

Habitat: tamarack bog, coniferous forest, spruce-fir forest, maple-conifer forest; log stages 2, 3, 4, and 5; under rock.

Collections: 18.

Known from peat bogs in boreal North America from the Atlantic Coast to western Ontario and eastern Minnesota. The author's experience shows, however, that it is not limited to bogs, because fully as many colonies were collected in cool northern woods of upland character as from tamarack swamps. In our collecting it was one of the most conspicuous forms and shared its dominance among the *fusca* group chiefly with *subsericea*.

25. *Formica fusca gelida* Wheeler

Minnesota: Saganaga Lake.

Wisconsin: Foxboro.

Habitat: coniferous forest, forest margin; log stages 2, 4.

Collections: 3.

As Wheeler has shown, this ant is diagnostic for high latitudes and for high altitudes. Though it is typical of the mountains of western United States and Canada, and is there restricted to high altitudes, three of its colonies were discovered in Minnesota. This seems very unusual, but it is not an impossibility, and the specimens would indicate an eastward extension of its range perhaps through the boreal portions of Canada to the point where it overlaps with its eastern relative, *F. f. algida*.

26. *Formica sanguinea aserva* Forel

Minnesota: Duluth (Wiljamaa, Gregg), Carlton, Holyoke, Knife River, Saganaga Lake.

Wisconsin: Foxboro.

Habitat: coniferous forest, maple-basswood forest, birch forest, aspen forest, forest margin, pasture, pioneer dunes; log stages 3, 4 and 5; under rock.

Collections: 24.

This is the usual slave-maker among the northern ants, but its colonies often are without auxiliaries. The young queen is known, however, to establish her colony by invading the nest of a species of *fusca*. Owing to the failure of making dulotic raids, her worker offspring gradually allow the colony to become a pure *aserva* community.

27. *Formica sanguinea subnuda* Emery

Minnesota: Duluth, Saganaga Lake.

Wisconsin: Foxboro.

Habitat: coniferous forest, birch-conifer ravine, aspen forest, forest margin; log stage 4; under log.

Collections: 6.

This is also an evergreen forest inhabitant and at times is found in alpine situations, but it is not prominent in our fauna to judge from the few records we have in the area.

28. *Formica pergandei* Emery

Minnesota: Saganaga Lake.

Habitat: coniferous forest; log stage 4.

Collections: 1.

According to Wheeler this member of the *sanguinea* group is very rare, and indeed we have seen it only on one occasion. There seems to be some question as to whether it normally has slaves, but the nest we collected was mixed and the auxiliaries belong to *F. fusca subsericea*.

29. *Formica emeryi* Wheeler

Minnesota: Saganaga Lake.

Habitat: coniferous forest.

Collections: 1.

Another member of the *sanguinea* group and very similar to *pergandei*. A single worker is in our possession.

30. *Formica ulkei* Emery

Minnesota: Duluth, Carlton, Carlton Co.

Wisconsin: Foxboro.

Habitat: basswood-maple forest, forest margin, meadow.

Collections: 9.

The species seems to be an indicator of forest margin or artificially induced marginal conditions such as roadsides and trails. Whereas in Illinois its occurrence is very local and unpredictable, in upper Minnesota is common in suitable situations.

31. *Formica rufa gymnomma* Wheeler

Minnesota: Duluth, Beaver Bay, Saganaga Lake.

Habitat: coniferous forest, spruce-pine forest, forest margin, pioneer dunes.

Collections: 8.

This important eastern member of the *rufa* group is well exemplified in the survey made, but most records of its distribution in America would probably show it to be more characteristic of the Transitional and Upper Austral life belts.

32. *Formica oreas compluta* Wheeler

Minnesota: Saganaga Lake.

Habitat: coniferous forest, spruce-fir forest.

Collections: 5.

This species and the typical form are distinctly western ants, but with the present records it seems to mix with the eastern fauna to a certain extent.

33. *Formica whymperi adamsi* Wheeler

Minnesota: Duluth.

Habitat: spruce bog.

Collections: 2.

Another form sparingly represented in the vicinity of Duluth but supposedly at home in northern climates and high altitudes.

34. *Formica dakotensis* Emery

Minnesota: Duluth.

Habitat: spruce bog.

Collections: 1.

This ant and its subspecies which follows are quite uncommon, and it was only by chance we obtained a few individuals.

35. *Formica dakotensis montigena* Wheeler

Minnesota: Duluth.

Habitat: spruce bog, forest margin.

Collections: 3.

36. *Camponotus herculeanus whymperi* Forel

Minnesota: Duluth (Lahtinen, Gregg), Angora (Roine), Rice Lake, Holyoke, Knife Island, Saganaga Lake.

Wisconsin: Superior.

Habitat: coniferous forest, tamarack bog, birch-conifer ravine, aspen forest, oak-maple forest; log stages 3 and 4; under rocks.

Collections: 25.

This is the exceedingly common carpenter ant of the north woods replacing *C. herculeanus pennsylvanicus* of the middle and southern states. It ranges completely across the continent in the boreal forests and in places reaches into the Transition Zone.⁴

⁴ Carpenter ants were found abundantly attacking sound timber in the white cedar stands of Minnesota (S. A. Graham, 1918), and this was regarded as unusual inasmuch as it had not been reported for *Camponotus herculeanus pennsylvanicus* nor for the subspecies *ferrugineus*. These forms do not occur in the coniferous forest, and the infestation may undoubtedly be traced to the northern subspecies *whymperi*, and possibly to the subspecies *noveboracensis* also.

37. *Camponotus herculeanus noveboracensis* (Fitch)

Minnesota: Duluth, Holyoke, Knife River, Knife Island, Saganaga Lake.

Wisconsin: Foxboro.

Habitat: coniferous forest, birch-conifer ravine, maple-basswood forest, red oak forest, oak-ash forest, aspen forest, pioneer dunes, forest margin, meadow, Lake Superior shore rocks; log stages 2, 4 and 5.

Collections: 15.

Again a northern ant but not as stenothermal as *whymeri*. It is very common in the subboreal and austral localities, and has a wide dissemination from east to west.

38. *Camponotus (Myrmentoma) caryae nearcticus* Emery

Minnesota: Duluth.

Habitat: floodplain thicket; log stage 4.

Collections: 1.

As far as our experience shows, this ant is the only sample of the *caryae* group in the area, and it was taken on just one occasion. Its main distribution is to the south.

39. *Polyergus rufescens bicolor* Wasmann

Minnesota: Saganaga Lake.

Habitat: spruce-fir forest.

Collections: 1.

The specimens taken were on an out-bound raid as they crossed a road and disappeared into thick grass. Despite repeated efforts to locate the nest we were unsuccessful, and consequently were unable to secure additional material.

40. *Polyergus rufescens fusciventris* Wheeler

Minnesota: Duluth.

Habitat: tamarack-spruce bog.

Collections: 1.

Isolated specimens collected accidentally with other ants.

In summarizing some of the data in the foregoing list, it may be useful to specify the ants which are distinctly boreal (leaving out of consideration those that are borderline cases), and to compare that assemblage with the austral fauna particularly in regard to those species which are absent from the Duluth area.

Northern Species

Leptothorax acervorum canadensis

Harpagoxenus canadensis

Myrmica brevinodis

Lasius niger sithkaensis

Formica fusca

Formica fusca subaenescens

Formica fusca algida

Formica sanguinea aserva

Formica ulkei

Formica whymeri adamsi

Formica dakotensis montigena

Camponotus herculeanus whymeri

One species of *Dolichoderus* and one of *Aphaenogaster* have been found in the north as the survey indicates, and additional ones of the latter genus are expected. With these two exceptions, the following fourteen genera of Eastern United States are entirely absent from northern Minnesota, (though present in Illinois), and represent a total of twenty-six species having a more southern distribution.

Stigmatomma

Aphaenogaster

Crematogaster

Solenopsis

Monomorium

Myrmecina

Strumigenys

Pheidole

Iridomyrmex

Dorymyrmex

Dolichoderus

Brachymyrmex

Paratrechina

Prenolepis

Even the common holarctic genera contain numerous species which do not establish themselves beyond the limits of the deciduous forest and grassland belt, and the most important of these may be cited.

Lasius brevicornis
Lasius flavus nearcticus
Lasius umbratus aphidicola ?
Lasius claviger
Lasius interjectus
Lasius latipes
Formica exsectoides
Formica rufa melanotica
Formica sanguinea rubicunda
Formica sanguinea subintegra

Formica pallidefulva spp.
Formica neogagates
Camponotus castaneus
Camponotus castaneus americanus
Camponotus herculeanus pennsylvanicus
Camponotus herculeanus ferrugineus
Camponotus caryae tanquaryi
Camponotus caryae discolor
Camponotus caryae subbarbatus

Several species, resting on the capture of single individuals, have been included as members of our fauna, but these will have to be confirmed by the discovery of flourishing colonies. The *Dolichoderus* . . . *aterrimus* and *Lasius* . . . *aphidicola* records conceivably could be accounted for as stray ants blown by a strong wind from distant nuptial flights. In both instances only deilated females were caught as they wandered apparently in search of nesting sites. At no time have colonies of these species been found.

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